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Physical activity of 1- 3- year old children in Finnish day care

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Virpi Katajarinne

Ohjaaja: Jyrki Reunamo

HELSINGIN YLIOPISTO

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Tekijä - Författare - Author		
Virpi Katajarinne		
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TiivistelmäReferat – Abstract

Fyysinen aktiivisuus on tärkeää lapsen kasvun ja kehityksen kannalta. Elintavat, kuten fyysinen aktiivisuus tai passiivisuus omaksutaan jo varhaislapsuudessa ja vaikka yleisesti usein oletetaan lasten olevan jatkuvasti fyysisesti aktiivisia, tutkimukset ovat osoittaneet, että pienten lasten fyysisen aktiivisuuden tasot ovat tyypillisesti matalia ja suurin osa lapsista eivät liiku suositusten mukaan. Alle kolmevuotiaiden lasten fyysisestä aktiivisuudesta on melko vähän tutkimustietoa. Suurin osa tutkimuksista on tehty 3- 5 – vuotiaiden ikäryhmässä, eikä näitä tuloksia välttämättä voida suoraan yleistää 1- 3- vuotiaisiin, sillä ikävuodet 0 -5 pitävät sisällään kolme toisistaan poikkeavaa kehitysvaihetta. Tämän tutkimuksen tavoitteena on selvittää, eroaako 1- 3- vuotiaiden fyysinen aktiivisuus vanhempien lasten fyysisestä aktiiviuudesta ja jos eroaa, niin millä tavoin ja selvittää, mitkä tekijät vaikuttavat 1- 3- vuotiaiden lasten fyysiseen aktiivisuuteen. Tämän tutkimuksen aineistossa fyysinen aktiivisuus on jaettu kolmeen eri tasoon: matala, kohtalainen ja korkea fyysinen aktiivisuus. Tämä tutkimus keskittyy korkeaan fyysiseen aktiivisuuteen.

Tämä tutkimus on kvantitatiivinen. Aineisto on koottu Helsingin yliopiston Orientaatioprojektissa vuonna 2010 ja koostuu19606 havainnosta, jotka on koottu 62 päiväkodissa ja perhepäivähoitajalla. Tutkimukseen osallistui 892 lasta, joista 173 oli tutkimushetkellä 1- 3- vuotiaita. Tässä tutkimuksessa tarkasteltiin 1- 3- vuotiaita. Tutkimuksessa aineistoa analysoitiin ristiintaulukoimalla ja tilastollista merkitsevyyttä khin- neliö testillä.

1- 3- vuotiaat lapset viettivät tämän tutkimuksen mukaan suurimman osan ajasta (57,4%) kello 8 ja 12 välillä matalalla fyysisen aktiivisuuden tasolla. Korkea fyysinen aktiivisuus lisääntyy iän myötä: 1- 3- vuotiailla sitä on 7,5%, 3- 5- vuotiailla 10,3% ja 6- 7- vuotiailla 11,2% ajasta. 1- 3- vuotiaiden fyysinen aktiivisuus poikkesi ainakin hieman kaikissa tarkastelluissa kategorioissa. Ikävuodet 1- 3 ovat ainutlaatuinen ajanjakso lapsen elämässä ja vaikka fyysisen aktiivisuuden tasot ja niihin vaikuttavat tekijät ovat melko samanlaisia kaikilla alle kouluikäisillä, on tiettyjä erityispiirteitä, jotka on syytä ottaa huomioon, kun suunnitellaan ja toteutetaan pienten lasten toimintaa ja oppimisympäristöjä. Fyysinen ja sosiaalinen ympäristö sekä lapsen ominaispiirteet ovat niin monin tavoin vuorovaikutuksessa keskenään, että se on hyvä tiedostaa tarkasteltaessa ympäristön vaikutuksia fyysiseen aktiivisuuteen.

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Varhaiskasvatus, liikunta, fyysinen aktiivisuus, taaperoikäiset, havainnointi

Keywords

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Tiivistelmä - Referat - Abstract

Physical activity is very important for the health and development on children. Behavioural habits, such as physical activity and sedentary behaviour are formed in early childhood and although children are widely believed to be continuously active, recent studies show that the levels of physical activity in early childhood are typically low, with many children not reaching the levels of physical activity proposed in guidelines. There is little research on the physical activity of under three- year- old children. Most of the research available has been done on the 3- 5- year olds and may not be directly transferrable to 1- 3- year olds, because the age range of 0 – 5 years encompasses three developmental periods, which all differ from each other. The purpose of this study is to try to find out if the physical activity of 1- 3- year olds differs from that of older age groups and if so, how it differs and what factors are related to the physical activity of children aged 1-3 years. In the data of this study physical activity is divided into three levels: low, moderate and high. This study focuses on high physical activity

This study is quantitative. The data of 19606 observations of children's physical and other activities used in this study is from The Orientation project of Helsinki University and has been collected in 2010. A systematic sampling was conducted in 62 day care centres and childminders in Finland. 892 children took part in this study and 173 of the them were 3 – years old or younger at the time. This study focuses on this age group. The data was analysed using cross- tabulation. The Chi- square test was used for testing statistical significance.

1- 3- year old children in Finnish day care spent the most time, 57,4% of the observation time between 8 and 12 o`clock in activities done on a low level of physical activity like deskwork. High physical activity increases with age: 7,5% for 1- 3- year olds, 10,3% for 4- 5- year olds and 11,2% for 6- 7- year olds. The physical activity of 1-3- year old children differed at least slightly from that of older children in all the categories observed in this study. The ages of 1- 3 years are a unique period and although the physical activity levels and the environmental factors that affect them are somewhat alike in all age groups, there are special qualities to take into consideration when planning and providing for the activities and learning environment of the youngest children. Because of the many interactions between the physical and social environment and child characteristics, the contextual factors should also be acknowledged when considering the influence of the environment on physical activity.

Avainsanat – Nyckelord

Varhaiskasvatus, liikunta, fyysinen aktiivisuus, taaperoikäiset, havainnointi

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Tables

1 Introduction

There is very little research on the effects of physical activity on the wellbeing of children under three. Most of the research has been done in the age group of children over five. The results on the effect of physical activity on the cognitive skills and learning of children over five vary, with some studies showing an improvement in cognitive skills linked with the increase of physical activity and some studies showing no effect. Overall it seems that decreasing the amount of time that children spend in sedentary activities, such as watching TV, improves the physical and mental wellbeing of children and may have a positive effect on cognitive skills (Haapala, E., Pulakka, A., Haapala, H. & Lakka, T. 2016)

The early years represent a period of rapid growth and development and are important for the development of positive health behaviours. Physical activity of children aged 0-5- years differs from older age groups. This period encompasses three developmental periods, each characterised by different physical activity patterns. The first year of life is called the infant period, the stage from 1 to 3 years is often described as the toddler period and ages 3- 5- years the pre-school period. A common characteristic of the 0- 5 age group is the sporadic and intermittent nature of physical activity. A small child´s physical activity consists of short bursts of moderate- to- vigorous physical activity alternating with periods of lower intensity activity. Because of the special nature of the age group of 1- 3- year olds, this study aims to find out if and how the physical activity of this age groups differs from that of older children.

The day care setting in Finland is characterised by most of the children attending full time day care because both parents work. All children under school-age have the right to early childhood education and care (ECEC). ECEC services are arranged by the municipalities, but families can also choose publicly subsidised private ECEC settings. The Finnish ECEC is based on an integrated approach to care, education and teaching, called the “educare” model, in which learning through play is essential. The National Core Curriculum for ECEC (2016) and local curricula based on it form a framework for ECEC. ECEC fees depend on family income and the number of children. Client fees in

municipal ECEC cover about 14 percent of the total costs. (Finnish National Agency for Education)

This study is done on data collected in The Orientation project of Helsinki University in 2010. The purpose of this study is to try to find out if the physical activity of 1- 3- year olds differs from that of older age groups and if so, how it differs. In the data of this study physical activity is divided into three levels: low, moderate and high. This study focuses on high physical activity

2 Physical activity

2.1. Why is physical activeness so important?

It is very important that physical activity is integrated into the lives of children early on, because it sets the foundation for a healthy, active lifestyle, which tracks into adulthood. There has been very little research done on physical activity on children 3- years old and younger. In a review by Cardon, Van Cauwenberghe and Bourdeaudhuij (2011) only two studies could be found. There is more data on 3 – 5- year old children, but it may not be directly transferrable to younger children, because the age range of 0 – 5 years encompasses three developmental periods, which all differ from each other.

Behavioural habits, such as physical activity and sedentary behaviour are formed in early childhood (Telama et al. 2013) and although children are widely believed to be continuously active, recent studies show that the levels of physical activity in early childhood are typically low and the levels of sedentary behaviour high, with many children not reaching the levels of physical activity proposed in global guidelines (Soini, 2015; Tucker, 2008). There has been a change in the behavioural habits of children with less physical activity and more time spent in passive activities, and this in part explains the increase in child obesity around the world (Haapala E.A., Pulakka, A., Haapala, H.L., Lakka T.A. 2016) TV viewing is common already in infants and toddlers. This may displace light physical activity and is associated with unhealthy snacking habits. (Cardon G., Van Cauwenberghe, E., De Bourdeaudhuij, I. 2011) Obesity is a substantial health problem, even in very young children (Neelon, S.E.B, Taveras, E.M., Ostbye, T. &

Gillman, M.W. 2013) and the habitual pattern of physical activity starts to develop very early on in life (Telama et al., 2014), therefore an important target for obesity prevention in young children may be their child care setting (Neelon et al. 2013).

The effects of physical activity on health have been quite clearly stated, but movement experiences are worthwhile and necessary for young children also because physical activity is one of the most important mediums trough which they form impressions about themselves and their surroundings (Eastman, 1997). Trough body movements children communicate, perceive the world and gradually begin to differentiate themselves from their environment. (Coelella & Morano, 2011)

2.2. Definition of physical activity in early childhood

Physical activity is defined as any body movement produced by skeletal muscles that raises energy expenditure above resting values (Caspersen, Powell, & Christenson, 1985). Children's physical activity reflects the development of their motor skills. The capacity for skilled movement and the ability to be active increases as these skills mature. The activity patterns of young children differ from those of older children and adults until biological, psychological and cognitive maturity is reached. Children characteristically engage in physical activity for a short duration of time and have frequent changes in activity. For children, the principal form of physical activity is active play, children rarely exercise for its own sake, like adults do. Therefore, the physical activity of children should be assessed in the context of active play. (Dwyer, Baur & Hardy 2009) Physical activity is usually divided, according to its intensity, into light, moderate and vigorous physical activity. In this study the focus is on vigorous physical activity, which is referred to as high physical activity, according to the division in the data of this study. The data was gathered in the Orientation Project of Helsinki University 2010.

Sedentary behaviour is any waking behaviour characterised by physical passiveness, such as sitting still, watching TV or sitting during motorised transport (Soini 2015, Haapala, E. et.al., 2016). The assessment of children´s physical activity is difficult do to the fact that children are typically active intermittently and in bouts of activity, which vary in intensity. (Soini et. al., 2014)

2.3. Fundamental motor skills, FMS

Motor competence can be defined as a child's ability to execute motor acts, such as co-ordination of fine and gross motor skills necessary for everyday tasks. Especially gross motor competence is important to growth, development and the opportunity to lead an active life. (Barnett et al. 2016) Visual, auditory, tactile and kinaesthetic abilities and their interaction are fundamental for the perception of one´s own body in space, time and environment. Perceptual abilities and motor processes allow children to explore their environment and recognize the relationship between their bodies and objects in space.

Motor skills can be divided into three categories: 1) Balance skills 2) Locomotor skills and 3) Manipulative skills. (Gallahue & Donnelly, 2003) Fundamental motor skills like walking, running, jumping, catching, throwing, kicking etc. are based on these three categories and the foundational movements for more specialized skills. Gradually these can be combined and enhanced into more complex skills in games and sports. They are like the ABC of movement and continue to be refined during the entire life span of a person. FMS develop in relation to the growing and maturing of a child and are influenced by practice opportunities and the growth environment of the child. Children learn the spatial (i. e., forwards/backwards, right/left etc.), temporal (i. e., before/after, fast/slow etc.), quantitative (i. e., a lot/a little, whole/part etc.) and qualitative (i. e., heavy/light, hard/soft etc.) elements of specific movement patterns by means of regular physical activity - free and organized play. (Colella & Morano, 2011)

2.4. Child development and physical activity

The observable physical activity of children goes hand in hand with the development of motor skills. (Dwyer; Bauer & Hardy, 2008) Data on physical activity of 3 to 5- year-old children may not be directly transferrable to younger children because the age range 0-5 years includes three developmental periods, each characterized by quite different physical activity patterns. The infant period is in the first 12 months of life and encompasses two periods; for the first 6 months, an infant's activity is reaching, grasping, turning the head and moving the arms and legs. In the next 6 months a child learns ru-

dimentary movement skills such as crawling, pulling one´s body to an upright position and moving by holding on to objects for support, and finally walking, which increases their possibilities for exploring and learning. (Cardon G., Van Cauwenberghe, E., De Bourdeaudhuij, I. 2011, Cliff, Reilly & Okely, 2008)

During the toddler period children gain strength and develop locomotor skills such as running, jumping and hopping. They develop increased hand-eye control and their manipulative skills develop further. (Fees, B.S., Fischer, E., Haar, S., Crowe, L.K. 2014, Gardon et al. 2011) Toddlers experiment with object- control skills such as kicking, catching, throwing and rolling and may also practice stability skills such as static and dynamic balancing (Cliff et al., 2008) The movement patterns of toddlers differ from those of children in other developmental periods; toddlers practice co-ordination, balance and control and day care environments can afford repetition of these emerging skills. (Bronwyn et al. 2011).

The preschool period of ages 3- 5 years is characterized by further development of locomotor and manipulative skills and stability (Cardon et al. 2011). Improvement in these skills does not happen by only as a part normal growth and development but only through opportunities to practice and receive feedback and encouragement from parents and other important people (Cliff et al. 2008)

Developmental functions are interdependent and a child´s development is influenced by progression or delay in in the development of each of them. Motor development is a process through which a child learns movement skills. It is a continuous process of modification that evolves with the interaction of the following factors: neuromuscular maturation, physical growth and child behaviours, tempo of growth and biological maturation and prior and new movement experiences. It is not easy to distinguish learning from development because the progress in a child´s performance involves the integration of these two processes. (Collela & Morano, 2011)

2.5 What do we know about the physical activity of children aged 1 – 3-years

There are not very many empirical studies focused specifically on toddlers. The methods used in these studies for recording physical activity were observation and accelerometers. There is some difficulty in comparing the results of these studies because the data was reviewed in relation to different guidelines on physical activity to define, whether the children met the recommendations for adequate amounts of daily physical activity.

In an observational study by Fees et al. (2014) of toddlers (16- 36 months) in the US, the main findings were that the most frequent physical activity intensity level was sedentary with limb movement, with no significant gender differences. Standing, sitting and walking were the most frequent types of physical activity. They also found that onlooking, a behaviour specific for toddlers, predicted a significant decrease in the odds for moderate to vigorous physical activity. Onlooking is described as watching other children play, without entering the play himself. Onlooking dramatically increases in frequency among children aged 2,5 – 3 and declines during the fourth year. Onlooking is sedentary in nature, but it is valuable time, because children learn about behavioural expectations by observing and this includes learning about physical activity. (Bronwyn et al. 2014)

In an Australian study by Hnatiuk et al. (2012) using accelerometers and parental surveys, the results showed that toddlers (19 months old) engaged on average in 184 min of light physical activity and 47 min of moderate to vigorous physical activity daily. 90,5% met the Australian physical activity recommendations for 0 – 5- year olds, of 180 min of light to vigorous physical activity per day, although this was mainly achieved through light- intensity physical activity, with only 47 min of modest to vigorous physical activity per day. An observation study of 2 – 3- year old Dutch children in day care showed that 59.4% of the indoor and 31.2% of the outdoor observations were classified as sedentary and only 5.5% on the indoor and 21.3% of the outdoor observations were classified as modest to vigorous physical activity (Gubbels et al. 2010).

In a study by Reunamo of Finnish children in day care, physical activity was lowest in the group of children that were evaluated by their teachers as having gross motor problems. This indicates that the children who need physical activity the most get it the least. (Reunamo 2012). In a study of three-year-old Finnish preschool children by Soini, the results showed, that for most of the day in childcare, children's levels and physical activity type were sedentary in nature, with moderate to vigorous physical activity accounting for only 2% of all observations. The children were most commonly observed sitting, standing and walking. These findings are in line with earlier studies in Finland and the US (Reunamo et al., 2014, Brown et al., 2009)

2.6. Recommendations and guidelines for children's physical activity

In the year 2010 when this data was collected Finland had recommendations for the physical activity of under- eight- year-olds (Recommendations for physical activity in early childhood education 2005). These recommendations have now been updated to respond to the changes in children's living conditions and are now called Finnish recommendations for physical activity in early childhood 2016. Joy, play and doing together (Ministry of Education and Culture, 2016) The new recommendations are intended for all organisations and individuals involved with under eight- year- olds, for example parents, teachers and healthcare professionals, whereas the old recommendations were made only for early education. The new recommended daily minimum for children is three hours of physical activity varying in intensity, with light activity, brisk outdoor activities and vigorous physical activity. These recommendations are based on scientific research data and the UN Convention on the Rights of the Child.

2.7 The effect of the physical and social environment in day care centres on children's physical activity

The environment for toddlers in day care is likely to be characterized by an emphasis on relationships, daily routine, minimizing transitions and developing self- care skills, such

as eating and getting dressed. (Fees et al. 2014) The association of the day care environment and children's physical activity can be viewed based on an ecological approach, which theorizes that the effects of the physical and social environment can be moderated by demographic characteristics, such as age and gender. The social and physical environment and child characteristics can show both independent and interactive effects on children's physical activity intensity. The presence of activity opportunities in the physical child care environment (indoors and outdoors) is positively related to physical activity intensity of 2 – 3- year olds. Group size also has a significant effect on physical activity, larger group size (both peers and staff) has been associated with lower activity intensity of children. (Gubbels et al. 2011)

In an activity monitor study of 3- 5- year old children by Finn, Johanssen and Specker (2001) the childcare centre was identified as a strong determinant of physical activity, it explained 46% of the variation in activity counts between 9 am and 5pm. This is important because counts during this period accounted for 50% of the daily activity counts. Childcare centre was the highest individual predictor of activity and the amount of indoor space, supervision, gross motor play equipment and outdoor play area may affect the quantity and quality of physical activity time. An association has also been found between the percentage of body fat among 12- month- old infants and square footage of childhood centres (Finn et al. 2001) While the characteristics of the physical child care environment, like the availability of play equipment and activity opportunities are linked to increased physical activity, it is important to move beyond an isolated view on physical environment factors. Interventions altering the childcare environment alone have not been effective in increasing children´s physical activity. (Gubbels et a. 2011)

2.7.1 Outdoor play in day care

Outdoor play is important for the healthy development of children and offers them chances to learn important skills in life, such as social competence, problem solving, creative thinking, and safety skills. It also develops their appreciation for the environment and gives them opportunities for exploring their community. Vigorous movement and play activities, such as running, climbing and jumping not only enhance muscle

growth, but also support the healthy development of the heart and lungs and all other vital organs necessary for normal physical development. (Clements, 2004)

In a study by Soini of three-year-old Finnish children in day care the children were more physically active outdoors, but nearly half of the children´s activities were sedentary in nature like playing in the sandbox and only 2% accounted as moderate- to- vigorous physical activity. Wheeled toys such as tricycles and scooters raised physical activity levels. (Soini, 2015)

2.7.2 Adult engagement

Gender differences have been found in several studies (Reunamo et al., 2014, Soini 2015) with boys being overall more physically active than girls. In a study by Soini, gender differences on physical activity intensity levels were seen during childcare days, but not on homecare days (Soini, 2015) One explanation for this can be found in the attitudes of early educators. Boys may be encouraged to take part in physically active play regularly, while girls are expected to take part in calmer activities (Sääkslahti, 2005). Positive prompts by staff have been found to be positively associated with children's physical activity intensity, although the same study also showed that 2 – year old children were less active when more staff members were present indoors, but this was not so for 3 – year olds. A possible explanation for this is that young children, especially girls, prefer to stay close to the adults, decreasing their activity levels when more educators are present. (Gubbels et a. 2011)

2.7.3 The effect of peers on children's physical activity intensity levels

Boys have been found to respond to peer prompting more positively than girls, with both negative and positive peer prompts having a positive effect on their activity intensity. The activity opportunities of the outdoor environment had a significant effect only if the children were playing with several peers. Perhaps because when playing alone or with one other peer may be more concentrated on playing and therefore pay less attention to the surrounding environment. Boys were found to respond more positively to

peer prompting than girls, with negative peer prompts having a significant positive effect on physical activity levels and positive prompts having a stronger effect on boys than girls (Gubbels et al., 2011)

2.7.4 Seasonal and daily variation in physical activity

The physical activity of children varies somewhat depending on time of day, time of year and between week days and weekends, but the data on this is not quite explicit with studies showing varying results. In an accelerometer study by Soini et al among Finnish 3 – year – old preschool children the only seasonal difference between autumn and winter was found for weekdays light physical activity, despite significant difference in seasonal temperatures. No difference in physical activity was found between weekdays and weekends. The study also showed that boys spent more minutes in light to vigorous physical activity than girls, which indicates that at least in Finland, gender is a more significant factor for physical activity than season or day of the week. Only 20% of the sample had ≥120 minutes light-to-vigorous physical activity, and 46% of children had ≥60 minutes moderate-to-vigorous physical activity. (Soini, 2015)

3 The aims of the study

The purpose of this study is to find out if the physical activity in day care of under three-year-old children differs from that of older children, and if so, how and which factors affect the physical activity of under three-year olds. The research problems are

(1) how does the physical activity of under three-year-old children differ from that of older children and

(2) what factors are related to the physical activity of under three-year-old children in Finnish day care.

In this study, the results of the 1 – 3- year old children were compared to those of older children in this same data to bring out the special characteristics of the physical activity

of this age group. Crosstabulation was used to find out how the demographic characteristics, such as age and the social and physical environment effect the physical activity of 1 – 3- year old children in Finnish day care. This study is quantitative in nature and statistical methods were used to analyse the data. In this study the data that was already collected, so it was possible to move straight from theory to analysing the data.

4 Methods

4.1 Participants and setting

The data used in this study is from The Orientation project of Helsinki University and has been collected in 2010. A systematic sampling was conducted in 62 day care centres and childminders in Finland. The data consists of 19606 observations of children's physical and other activities collected in 62 Finnish day care centres and in the homes of child minders collected between January and May 2010. 892 children in took part in this study in Finland. 173 of the them were 3 – years old or younger at the time. This study focuses on this age group.

4.2 Data collection

The method of data collection in this study was systematic observation. Observation is a method of collecting data in the natural setting of those being observed. The key condition is that there are no variables that are not usually present which might influence or disrupt what is being observed. (Newby, 2014) Observation as a research process offers the opportunity to gather data from naturally occurring social situations and therefore gives the researcher the ability to look directly at what is taking place, rather than having to rely on second- hand information. Observation can be facts, such as numbers or events as they happen, and it can also focus on behaviours or qualities.

What counts as evidence and what is recorded as facts depends on when, where and for how long the observers look and how they look at events that are taking place. Therefore, it is important that the observers are provided with training to ensure that they pro-

ficiently, efficiently and consistently enter the same sort of data in the same categories to ensure inter- rater reliability. (Cohen, Manion & Morrison, 2007) In this study, the kindergarten teachers were given training in the autumn semester of 2009 on observing children, where they learned about observing and the categories used in this study. They also practised between the training sessions. The teachers did not collect data in their own groups. The possible roles of the observer lie on a continuum varying from complete participation to complete detachment. (Cohen et al. 2007) In this study the observers were instructed not to make contact with the children, but to answer briefly if the children asked questions. (Reunamo 2014)

If the observation is concerned with the incidence, presence and frequency of elements and wishes to compare one situation with another, then it is wise to have a prepared observation schedule. In systematic observation, the observer adopts a passive, non – intrusive role, noting down what happens on an observational schedule. (Cohen et al. 2007) The aim of the Orientation project was to gather reliable data on what really goes on in Finnish day care and what the interaction between the educators and children is like and therefore systematical observation was opted.

4.3 Procedures

In this study, the observations were made on children's actions between 8:00 am and 12:00 pm on a four- minute interval. One observation lasted one minute, followed by two minutes of coding and another two minutes for preparing for the next observation. (Reunamo 2014). After all the children on the list had been observed, the observations started again from the top of the list. Each child was observed approximately 22 times during the study. This kind of structured observation generates numerical data, which makes it possible to make comparisons between settings and situations and brings out frequencies, patterns and trends. (Cohen et al. 2007)

4.4 Ethical considerations

Ethical issues require finding a good balance between the desire to bring out the truth and the participant´s rights and values potentially threatened by the research. Acquiring informed consent from all the participants of a study is important, but not always possible. For instance, being observed may change the behaviour of the participants, so sometimes covert observation is necessary and full informed consent is not possible due to the nature of the research. Informed consent is required for participants, but because children cannot make such decisions due to their young age, the researcher must ask the permission of the adults that are responsible for the children. (Cohen, Mannion & Morrison, 2007) In this case these adults were the parents of the children, who were given information on the study and who made the decision of the child´s participation. It is also advisable to seek the consent of the children taking part in a study, but for very young children enough information may be that they are told that an adult will be watching them or playing with them (Cohen et al. 2007). In this study the observers were advised not to make contact with the children but to answer briefly if the children asked questions. The educators working in the day care centres were aware of the study taking place.

Another important ethical consideration is that of anonymity and confidentiality. The researcher must be able to ensure the participants that they will remain anonymous and that all the gathered information will be treated with strict confidentiality. (Cohen et al. 2007) In this study the children were coded with numbers, so the data is anonymous.

4.5 Description of the data and data analysis

In this study the scale of children's physical activity was 1) Low (sitting, using pen, eating etc.); 2) Intermediate (walking, whole body movements) and 3) High (includes at least some running, romping or physical exertion). The children´s physical activity was observed during all the activities that take place in day care.

The data was analysed using cross- tabulation. This form of data analysis is responsive to the data being presented and brings forth what the data themselves suggest (Cohen et al. 2007)

5 Overview of the results

The research question in this study are:

- How does the physical activity of under three-year-old children differ from that of older children?

- What factors are related to the physical activity of under three-year-old children in Finnish day care?

The tables in this chapter show the levels of physical activity in different situations divided into the age group of 1-3- year olds, 4-5- year olds and 6-7- year olds. The Chi-square test has been used for testing statistical significance and Cramer`s V to find out the magnitude of the effect. The term physical activity is referred to as PA in the tables.

Physical activity levels of children in Finnish day care

The results of this study show that children in Finnish day care spent 56,2%, 2 hours and fifteen minutes, of the observation time (between 8 and 12 o'clock) in activities done on a low level of physical activity, like desk work, eating or listening to book being read. 33,8%, one hour and 21 minutes, was spent on activities with moderate physical activity, which require walking and whole-body movement. Only 10% of the time, 24 minutes, is spent on activities done on a high level of physical activity, which include at least some running, brisk movement and physical exertion. In the age group of children 1- 3- years the figures are 57,4% on a low level, 35,2% and only 7,5% on a high level of physical activity. This means that 1-3- year old children spend 2 hours and

18 minutes on a low level of physical activity, one hour and 24 minutes on a moderate level and are physically active on a high level for only 18 minutes in a time of four hours. This does not meet the recommendations for physical activity in early childhood education which were valid in the year 2010 when this research data was gathered (Guides of the Ministry of Social Affairs and Health 2005:17).

Table 1, Physical activity level

Physical activity level and age group crosstabulation					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Physical activity level of the child	Low (desk work, eating)	57,4%	56,3%	55,2%	56,2%
	Moderate (walking, whole body movement)	35,2%	33,4%	33,5%	33,8%
	High (at least some running, brisk movement, physical exertion)	7,5%	10,3%	11,2%	10,0%
Total		100%	100%	100%	100%

If 1-3- year old children were active for such a short time, what were they doing when high physical activity was observed and what factors would seem to affect the levels of physical activity in this age group?

The general activity frame of the child (what the child needs to do)

The following table is a crosstabulation of the general activity frame of the child and the age group of the children. It shows that in the age group of 1- 3 – year olds less time was spent on direct education indoors and more time spent on basic care than in older age groups. Direct education was defined in the observation instructions as activities where adults define the educational content, for instance teaching, group gatherings and story time. Basic care includes getting dressed, going to the toilet, hygiene, resting and preparing for activities like going outside. 1- 3- year olds spent 14,8%, 36 minutes, of the observation time of four hours in direct education indoors, when the corresponding figures for 4- 5- year olds were 17,6%, 42 minutes and for 6- 7- year olds 25,4%, 61 minutes. Times spent on basic care activities were 17,3%, 42 minutes for 1- 3- year olds, 14,5%, 35 minutes for 4- 5- year olds and 10,4%, 25 minutes for 6- 7- year olds.

Children in all age groups spent the most time on free play, both indoors and out. 1- 3- year olds spent 1 hour and 41 minutes, 4- 5- year olds 1 hour and 42 minutes and 6- 7- year olds 1 hour and 33 minutes on free play. In the observations free play was defined as activity, in which the children can decide what the play, how they play and who they play with.

In the age group of 1- 3- year olds there is more time spent on free play outdoors than in older age groups, but the difference between the youngest and oldest age group was only 6 minutes on the time spent. 1- 3- year olds spent 19,3%, 46 minutes of the observation time of hour hours on free play outdoors, 4- 5- year olds 18,6%, 45 minutes and 6- 7- year olds 16,6%, 40 minutes. The most time in the age groups of 1- 5- year olds was spent on indoor free play. In the age group of 6- 7- year olds the most time was spent on direct education indoors, although only five minutes more than on free play indoors. Eating takes up the most time after free play in all age groups, approximately 48 minutes. This time includes breakfast and lunch, waiting and preparing for eating and tidying up afterwards. Chi- square test shows that the relationship between these variables is significant x^2 (12, *n* = 19032) =325.880, p =.000, Cramer´s V=.093

Table 2, General activity frame of the child

General activity frame of the child and age group crosstabulation

		1-3- years	4-5- years	6-7- years	Total
General activity frame of the child	Direct education indoors	14,8%	17,6%	25,4%	19,5%
	Scaffolded play indoors	2,7%	1,4%	1,8%	1,8%
	Free play indoors	22,7%	23,9%	22,6%	23,2%
	Structured outdoor activity	2,6%	2,9%	3,8%	3,1%
	Free play outdoors	19,3%	18,6%	16,6%	18,1%
	Basic care	17,3%	14,5%	10,4%	13,8%
	Eating	20,6%	21,0%	19,4%	20,4%
Total		100%	100%	100%	100%

In the age group of 1- 3 – year olds high physical activity was observed the most in free play, both indoors (16,4%) and out (58,8%). Outdoor free play was the most active time in all age groups. Indoor free play showed more observations of high physical activity

in the 1- 3- year old age group than older age groups, 16,4% for 1- 3- year olds, 12,7% for 4- 5- year olds and 13,7% for 6- 7- year olds. There are also more observations of high physical activity in basic care activities than in older age groups. In this age group, less high physical activity was observed in direct education than in the age groups of older children, but they also spent less time on direct education. The situations where the group was eating, included less high physical activity, when compared to older children, in the youngest age group none at all. Chi- square test shows that the relationship between these variables is significant x^2 (12, n =1896) = 21.135, p = .048, Cramer`s V= .075

Table 3, General activity frame of the child and PA

General activity frame of the child and age group crosstabulation, high PA level

		1-3- years	4-5- years	6-7- years	Total
General activity frame of the child	Direct education indoors	9,1%	13,4%	14,2%	13,0%
	Scaffolded play indoors	2,2%	1,0%	2,0%	1,6%
	Indoor free play	16,4%	12,7%	13,7%	13,7%
	Scaffolded outdoor activity	9,7%	9,2%	11,9%	10,3%
	Outdoor free play	58,8%	60,2%	54,2%	57,8%
	Basic care	3,8%	2,9%	2,7%	3,0%
	Eating	0,0%	0,6%	1,2%	0,7%
Total		100%	100%	100%	100%

The most observations of high physical activity were recorded in free play outdoors and the following table shows that 22,8% of activity in free play outdoors was recorded as high physical activity in the age group of 1- 3- year olds, 33,4% for 4- 5- year olds and 36,5% for 6- 7- year olds. Physical activity increases with age also in free play outdoors.

Table 4, Free play outdoors and PA

Free play outdoors and PA

		Low PA	Moderate PA	High PA	Total
Free play outdoors	1-3-years	23,3%	53,9%	22,8%	100%
	4-5- years	19,2%	47,4%	33,4%	100%
	6-7-years	17,1%	46,4%	36,5%	100%

Distance from closest adult

Adults are closer to small children (aged 1-3- years) than older children. The following table shows that adults are at a distance of 0 -1 meters for 33,2%, 1 hour and 20 minutes, of the observation time (between 8 and 12 o'clock) and at distance of over 5 m for only 13,2%, 32 minutes. With 6 -7 – year olds the corresponding figures are 23%, 55 minutes at 0 -1 m and 21,8%, 52 minutes at over 5 meters. Chi- square test shows that the relationship between these variables is significant. X^2 (10, *n* = 18681) =230.202, p =.000, Cramer´s V=.078

Table 5, Distance from closest adult

Distance from closest adult and age group crosstabulation

		1-3- years	4-5- years	6-7- years	Total
Distance from closest adult	0 - 1 m	33,2%	25,0%	23,0%	26,2%
	1.1 - 2 m	21,6%	21,8%	19,8%	21,1%
	2.1 – 3 m	13,8%	14,8%	14,2%	14,4%
	3.1 – 5 m	18,0%	19,9%	21,3%	19,9%
	5.1 – 10 m	10,3%	14,3%	16,2%	14,0%
	Over 10 m	3,1%	4,3%	5,6%	4,4%
Total		100%	100%	100%	100%

This next crosstabulation shows that there were the most observations of high physical activity in the age group of 1-3- year olds when the closest adult was at a distance of 3,1- 5 m from the child. In this age group there are also more observations of high physical activity when adults are close (0-2 meters away), than with older children. The most observations of high levels of physical activity were recorded when adults were 3,1 – 10 meters away from the children. This is the same in all age groups, but for the youngest children the physical activity levels start to decrease as adults get further away. In the age group of 6- 7- year olds physical activity is the highest when adults are 5,1- 10 meters away. Chi- square test shows that the relationship between these variables is significant. X^2 (10, *n* =1871) =40,361, p =.000, Cramer´s V= .104

Table 6, Distance from closest adult and PA

Distance from closest adult and age group crosstabulation, high PA level

		1-3- years	4-5- years	6-7- years	Total
Distance from closest adult	0-1m	11,1%	8,0%	6,3%	7,9%
	1,1-2m	17,2%	13,3%	9,3%	12,5%
	2,1-3m	14,0%	14,0%	11,4%	13,0%
	3,1-5m	24,8%	27,2%	24,6%	25,9%
	5,1-10m	20,4%	25,6%	32,8%	27,4%
	Over 10m	12,4%	11,7%	15,7%	13,3%
Total		100%	100%	100%	

The related or closest adult's main action

There is less direct education and more general interaction between educators and one child or a group of children in the age group of 1 – 3- year olds than older children, as can be seen in the table below. There is much more teaching (20,8%) in the oldest age group than in younger age groups (11,7% for 1- 3- year olds and 14,8% for 4- 5- year olds) and less time spent on interaction with one child (12,8% for 6- 7- year olds, 18,8% for 4- 5- year olds and 20,9% for 1- 3- year olds). There is less time spent in observing the children and more time spent interacting with them in the youngest age group than in the two older age groups. Chi- square test shows that the relationship between these variables is significant X^2 (10, n = 18787) =328.204, p =.000, Cramer´s V=.093

Table 7, Main action of the closest adult

Main action of the closest adult and age group crosstabulation					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Main action of the closest adult	No child contact	12,3%	12,2%	12,2%	12,2%
	Observing the children	19,8%	23,3%	25,1%	23,1%
	Interacting with one child	20,9%	18,8%	12,8%	17,3%
	Interacting with a group of children	22,4%	18,9%	18,8%	19,7%
	Teaching	11,7%	14,8%	20,8%	16,1%
	Unspecified situation	12,9%	12,0%	10,1%	11,6%
Total		100%	100%	100%	100%

The following table shows that the most observations of high physical activity levels were recorded when educators were present and monitoring the situation, but not giving any direct education, 42,9% with 1 – 3- year olds. In the age group of 1- 3- year olds there are more observations of high physical activity in an unspecified situation than in older age groups. There were also more observations of high physical activity levels recorded when an adult was interacting with a group of children in the age group of 1- 3- year olds than in older age groups. Chi- square test shows that the relationship between these variables is significant x^2 (10, n =1877) =49,985, p = .000, Cramer´s V= .115

Table 8, Main action of the closest adult and PA

Main action of the closest adult and age group crosstabulation, high PA level					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Main action of the closest adult	No child contact	13,5%	13,0%	14,2%	13,5%
	Observing the children	42,9%	44,6%	44,1%	44,2%
	Interacting with one child	9,3%	11,2%	7,4%	9,5%
	Interacting with a group of children	15,7%	14,3%	10,4%	13,1%
	Teaching	7,7%	9,9%%	18,3%%	12,6%
	Unspecified situation	10,9%	7,0%	5,5%	7,1%
Total		100%	100%	100%	100%

The main action of the child (what the child does)

Children aged 1 – 3- years spend more time, 13,3%, 32 minutes on orientation, without focus or proper contact with others e.g. wandering around, than children in older age groups. They also spend more time playing with toys and less time on rule play and tasks or seat work. Time spent on play or exploring toys, materials or the setting was recorded for 21%, 50 minutes in the age group of 1- 3- year olds, 17,7%, 42 minutes for 4- 5- year olds and 15,1%, 36 minutes for 6- 7- year olds. Time spent on task or seat work was 5,8%, 14 minutes in the age group of 1- 3- year olds, 8,8%, 21 minutes and 16,4%, 40 minutes in the age group of 6- 7- year olds. Chi- square test shows that the relationship between these variables is significant X^2 (18, *n* =19027) =566,611, p =.000, Cramer´s V= .122

Table 9, Main action of the child

Main action of the child and age group crosstabulation

		1-3- years	4-5- years	6-7- years	Total
Main action of the child	Orientation	13,3%	10,9%	11,7%	11,7%
	Hanging about with others	6,5%	7,2%	7,8%	7,2%
	Play or exploring toys, materials and setting	21,0%	17,7%	15,1%	17,6%
	Reading, watching a video or performance	5,1%	5,3%	4,6%	5,0%
	Rule play	2,3%	4,4%	5,9%	4,4%
	Task or seat work	5,8%	8,8%	16,4%	10,6%
	Action not allowed	2,0%	1,7%	2,5%	2,0%
	Acting according to general frame	31,9%	30,8%	25,1%	29,2%
	Other action	3,7%	2,7%	2,5%	2,9%
Total		100%	100%	100%	100%

When the child's main action is orientation, very little high physical activity is recorded, only 3,1%, as can be seen in the table below. The most observations of high physical activity were recorded in play, 35,2% and when acting according to general frame 42,6% and hanging about with others 21,4%. In all these categories the youngest children

showed more physical activity than the two older age groups. Children aged 1 – 3- years spend the largest amount of time during the morning hours in day care playing with toys, so playing with toys is an important form of physical activity for small children. Chi- square test shows that the relationship between these variables is significant x^2 (18, *n*= 1957) = 93,647, p=.000, Cramer´s V=,157

Table 10, Main action of the child and PA

Main action of the child and age group crosstabulation, high PA level

		1-3- years	4-5- years	6-7- years	Total
Main action of the child	Orientation	3,1%	3,1%	2,0%	2,7%
	Hanging about with others	21,4%	14,3%	14,8%	15,7%
	Play or exploring toys, materials and setting	35,2%	32,2%	24,9%	30,0%
	Roleplay or imaginary play	14,5%	16,1%	14,8%	15,4%
	Reading, watching a video or performance	0,3%	0,5%	0,1%	0,3%
	Rule play	2,7%	4,0%	5,4%	4,2%
	Task or seat work	7,7%	11,4%	20,3%	13,4%
	Action not allowed	1,6%	1,1%	1,7%	1,4%
	Acting according to general frame	42,6%	38,7%	31,2%	37,2%
	Other action	1,3%	1,2%	1,2%	1,25
Total		100%	100%	100%	100%

The child's main object of attention

In the age group of 1 – 3 – years the children spent the most time, 32%, with their focus on non-social objects such as toys, sand or blocks. In minutes, it means that the children spent approximately 1 hour and 17 min between 8 and 12 o'clock with their attention focused on non-social objects. This is more than in older age groups, with the corresponding figures for 4 – 5- year olds of 24,7%, 60 min and 6 – 7-years olds 21,2%, 50 min. 1 – 3- year old children also spent less time with their attention focused on other children than older children did. Their main object of attention was a group of children for 9,8% of the time, 24 min. For 4 – 5- year olds the corresponding figures were 17,7%, 43 min and 6 – 7- year olds 23,1%, 55 min. The emphasis moves from exploring objects and the environment towards social interaction with peers as the child ages. 1-3- year olds spent more time than older children with their attention focused on the

overall situation, 26,8%, on hour and four minutes. This was described in the observation instructions as a situation with so many elements that it is impossible to name one object of attention. Chi- square test shows that the relationship between these variables is significant x^2 (8, *n* = 19008) =474.107, p =.000, Cramer´s V=.112

Table 11, Child´s object of attention

Child´s object of attention and age group crosstabulation

		1-3- years	4-5- years	6-7- years	Total
Child´s object of attention	Non- social object	32,0%	24,7%	21,2%	25,2%
	Adult	14,4%	11,9%	13,7%	13,1%
	Another child	17,0%	23,2%	20,1%	20,8%
	A group of children	9,8%	17,7%	23,1%	17,7%
	Overall situation	26,8%	22,5%	21,8%	23,2%
Total		100%	100%	100%	100%

There are more observations of high physical activity (23,1%) when the child´s attention is focused on a non- social object than in older age groups (15,1% for 4- 5- year olds and 12,2% for 6- 7- year olds) as can be seen in the following table. Because 1- 3- year old children also spent the most time with their attention focused on non- social objects, this means that playing with toys and materials is important physically active time for small children. The most high physical activity was recorded in all age groups when the child's attention was focused on another child or a group of children, with the difference that for 1- 3- year olds there was more physical activity when the attention was focused on one child (30,4%) rather than a group of children (24,7%), while for older children it was the other way around. Chi- square test shows that the relationship between these variables is significant. x^2 (8, *n* = 1893) = 67.828, p =.000, Cramer´s V=.134

Table 12, Child´s object of attention and PA

Childs object of attention and age group crosstabulation, high PA level					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Childs object of attention	Non- social object	23,1%	15,1%	12,2%	15,4%
	Adult	5,4%	3,6%	3,6%	3,9%
	A Child	30,4%	27,5%	22,2%	26,0%
	A group of children	24,7%	31,6%	45,5%	35,6%
	The whole situation	16,5%	22,2%	16,4%	19,1%
Total		100%	100%	100%	100%

Child's involvement

The children's involvement levels were observed on a scale of 1 to 5. The levels are:

1. simple, stereotypic, repetitive, passive action with no energy or cognitive demand.
2. frequently interrupted activity and engagement.
3. Mainly continuous activity, easily distracted, lacking mental engagement.
4. Continuous activity with intense moments, child not easily distracted.
5. Sustained intense activity, concentration, creativity, mental engagement and persistence.

In the age group of 1 – 3 - year old children, more observations of low involvement levels were made than in older age groups. For 1- 3- year olds 22,5% of the observations were placed on level 1 while 15,5% for 4- 5- year olds and only 12,6% for 6- 7- year olds. This means that 1- 3- year olds spent 54 minutes of the four-hour observation time on a low level of involvement, 4- 5- year olds 37 minutes and 6-7- year olds 30 minutes. The largest amount of observations were placed on levels 3 and 4 in all age groups, but 1- 3- year olds had less observations, 22,6% placed on level 4, when 4- 5- year olds had 30,2% and 6- 7- year olds 32,2% and 1- 3- year olds had as many observations on level 1 as on level 4. 1- 3- year olds also had only 5,4% of observations placed on level 5, when 4- 5- year olds had 10,7% and 6- 7- year olds 9,7%. Chi- square test shows that the relationship between these variables is significant. x^2 (8, n =19028) =380.831, p =.000, Cramer´s V= .100

Table 13, Child´s involvement

Child´s involvement and age group crosstabulation					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Child´s involvement	Level 1	22,5%	15,5%	12,6%	16,1%
	Level 2	19,8%	15,5%	15,2%	16,3%
	Level 3	29,8%	28,2%	30,2%	29,2%
	Level 4	22,6%	30,2%	32,3%	29,2%
	Level 5	5,4%	10,7%	9,7%	9,2%
Total		100%	100%	100%	100%

The most observations of high physical activity in the age group of 1- 3- year olds were recorded on involvement levels 3 (32,1%) and 4 (39,3%). There was less high physical activity on level 5 in the age group of 1- 3- year olds (7,5%) than in older age groups (18,8% for 4- 5- year olds and 21,4% for 6- 7- year olds). More observations of high physical activity were recorded on level 2 (16,4%) for 1- 3- year olds than older age groups (10,2% for 4- 5- year olds and 8,2% for 6- 7- year olds). Chi- square test shows that the relationship between these variables is significant. x^2 (8, n = 1896) = 57,977, p =.000, Cramer´s V= .124.

Table 14, Child´s involvement and PA

Involvement and age group crosstabulation, high PA level					
		1-3- years	**4-5- years**	**6-7- years**	**Total**
Child´s involvement	Level 1	4,7%	4,5%	3,0%	4,0%
	Level 2	16,4%	10,2%	8,2%	10,5%
	Level 3	32,1%	22,3%	20,1%	23,2%%
	Level 4	39,3%	44,2%	47,2%	44,5%
	Level 5	7,5%	18,8%	21,4%	17,9%
Total		100%	100%	100%	100%

6 Summary

Children in Finnish day care spent the most time, 56,2%, of the observation time between 8 and 12 o`clock in activities done on a low level of physical activity like desk-

work and for 1- 3- year olds the figures were even slightly higher, 57,4%. High physical activity levels were recorded as follows: 7,5% for 1- 3- year olds, 10,3% for 4- 5- year olds and 11,2% for 6- 7- year olds. The amount of physical activity increases with age, but none of the age group reach the recommended amount of two hours brisk physical activity (Guides of the Ministry of Social Affairs and Health 2005:17). Gubbels et al. (2011) study with 2-3- year old children showed similar results, with 59,4% sedentary activity and only 5,5% moderate- to-vigorous physical activity in indoor observations. Research by Soini (2015) with accelerometers showed even lower levels of physical activity, with 69% sedentary activity and only 2% moderate- to- vigorous physical activity.

Most of the observations with high physical activity in the age group of 1- 3- year olds were recorded in free play outdoors, 58,8% and 46 minutes of the observation time was spent on free play outdoors. This means that most of the physical activity in Finnish day care takes place outside. In the 1-3- year old age group 22,8% of outdoor free play was recorded as high physical activity. This is similar to the results of Gubbels et al. (2011) observation study were that 21,3% of outdoor activities were on a modest- to-vigorous physical activity level, but Soini's (2015) study showed much lower levels, with only 2% moderate- to-vigorous physical activity.

Free play indoors had the second largest amount of observations of high physical activity, 16,4%. In a study of the activity intensity of toddlers during indoor play by Fees et al. (2014) results showed that toddlers spent 74% of the time during indoor free play engaged in sedentary activity and self- select predominantly sedentary activities. The most frequent activities were manipulative experiences, self- care and onlooking, with only 6% moderate to vigorous physical activity in all activity contexts. (Fees et al. 2014) The most dominant motor behaviours in research of this age group were sitting, standing, and walking. (Fees et al. 2014, Soini 2015)

The biggest differences between age groups are in the child´s object of attention and in involvement levels. Children in the age group of 1- 3- years spent the most time with their attention focused on a non- social object such as toys, sand or building blocks. They also spent less time with their attention focused on other children than older children did. In this age group there were more observations of high physical activity when

the child's attention was focused on a non- social object than in older age groups. In light of these results it seems that playing with toys is physically active time for young children.

The involvement levels of 1- 3- year old children differed from those of older children, being more evenly distributed into the different categories, except for level 5, the highest level of involvement, that was observed less for the youngest age group. 1- 3- year olds also had more observations placed on levels 1 and 2, the lowest levels of involvement. Also, the amount of observations with high physical activity were more evenly distributed among the levels of involvement than in older age groups, again with the exception of level 5, in which there were less observations than in older age groups. It would seem that in the age group of 1- 3- year olds high physical activity shows itself in bouts of activity, varying in length and intensity.

7 Reliability

Reliability means the consistency in results if the same test is conducted over a period of time. The validity of a test tells us how well a test measures what it is meant to measure (Metsämuuronen, 2011). Reliability is important, but it is not sufficient alone. To be reliable a test also needs to be valid. A reliable test gives consistent results that can be generalized to the whole population.

This study was conducted using the method of systematic observation. Observation is more than just looking, it´s a technique of looking in a focused and systematic way. Observation can be quite demanding, the events, activities and interactions that go on in the setting can be hectic and unpredictable. The observer must make decisions about what to observe and what to ignore. (Wilkinson & Birmigham, 2003) In this study because the method used was systematic observation, the observers had the observation sheet and schedule to guide their work and help them focus their attention.

Observation is a good way to gather information about the way people behave and interact with each other in social setting (Wilkinson & Birmigham, 2003)

This study covered the whole range of activities that take place in day care, so even though was done between 8 and 12 o´clock the results can be thought to be accurate throughout the day. The data consists of 19606 observations of children's physical and other activities collected using systematic sampling in 62 Finnish day care centres and in the homes of child minders. 892 children in took part in this study and 173 of the them were 3 – years old or younger at the time. The large sample size and the fact that it covers a large amount of different day care centres adds to the reliability of this study. The data was collected between January and May 2010 and the observation dates were not given to the day care centres beforehand, so they could not prepare for the observation in any way. Randomized observation dates along with the long period of time in which the observations were gathered ensure that the results portray everyday life in Finnish day care quite well.

Inter- rater reliability is a form of reliability used to assess the degree in which different raters agree on their assessment decisions. To increase the reliability of the observations the observers were given training in autumn 2009. Rating the physical activity level of the child was sometimes difficult if the physical activity of the child varied a lot during the one-minute observation time. (Reunamo, 2014)

8 Discussion

The physical activity levels on children in day care can be investigated with an ecological systems view of environmental influences on behaviour and in this case physical activity in particular and can be seen as an interaction between physical environment, social environment and child characteristics. The influence of the environment on physical activity can be moderated by different factors, like age and gender. Age has been found moderate the effect of the physical child- care environment, for instance playground markings have a stronger effect on younger children. (Gubbels et al. 2011, Gubbels, Stafleu, van Kann, Candel, Dagnelie & de Vries 2010, Brown et al. 2009) In this chapter the results of the study are viewed in light of the ecological systems view of environmental influences on behaviour.

In this study the data shows that children in Finnish day care spent over half (2 hours and fifteen minutes) of the four- hour observation time on activities done on a low level of physical activity and only 24 minutes on activities done on high level of physical activity. In the age group of 1- 3- year olds the times were 2 hours and 18 minutes on a low level of physical activity and only 18 minutes on a high level. This does not meet the Recommendations for physical activity in early childhood education 2005, which were valid in the year 2010 when this data was collected, which suggested that children need at "least two hours of brisk physical activity every day". The children were physically active on a moderate- to- high level for 1 hour 42 minutes in the time between 8 and 12 o´clock, but activities were categorized in the moderate section if they included walking and whole-body movement, so they perhaps can´t all be classified as being "brisk" physical activity.

The general activity frame of the child (what the child needs to do) is part of the child´s physical and social environment and differences that were found between age groups show how demographic characteristics such as age moderate the influence of the environment. In this study the category "the general activity frame of the child" showed some differences between the age group of 1- 3- year olds and older age groups. Children aged 1- 3- years spent less time in situations with direct education and more time on basic care. This is in line with Bronwyn et al. (2014) study findings that the environment for toddlers in day care is likely to be characterized by an emphasis on relationships, daily routine, minimizing transitions and developing self- care skills, such as eating and getting dressed. Basic care activities also offer small children a good chance to develop their motor skills, if they are encouraged to be independent in these activities. However, basic care situations seldom include high physical activity, which was the focus of this study. Basic care as the general activity frame of the child, only accounted for 3,8% of the observations of high physical activity. This was still more than in older age groups.

The outdoor environment encourages physical activity. The most observations of high physical activity were made when the general activity frame of the child was free play. Free play outdoors accounted for 58,8% and free play indoors for 16,4% of the observations. This is in line with earlier findings that Brown et al. (2009) that one of the social environment factors that were associated with physical activity levels was that child- in-

itiated instead of staff- initiated play was associated with increased physical activity. In this study direct education indoors only accounted for 9,1% for the observations of high physical activity in the 1- 3- year old age group, less than in older age groups (13,4% for 4- 5- year olds and 14,2% for 6- 7- year olds). This may mean that adult initiated activities in the 1- 3- year old age group are often sedentary in nature. Adding physical activity to direct education indoors, would have a positive impact on physical activity levels of children, because positive prompts by staff have been found to be positively related to activity intensity (Gubbels et a. 2011) Because the most observations of high physical activity were recorded outdoors, the importance of outdoor activity must be understood among educators. Most of the time spent outdoors was free play in this study, so perhaps it´s worth considering if in addition to the free play time, groups could also move some of their direct education outdoors, and thereby easily add some more physical activity to their day.

An important factor of the social environment in day care is the educators that work there. Their actions and attitude towards physical activeness in children is critical in how, when and where high physical activity is allowed. Educators also shape the physical environment of day care by arranging furniture and deciding what kind of equipment is purchased and how much if any of the equipment is at the children´s disposal. Availability of play equipment and activity opportunities are linked to increased physical activity (Gubbels et al. 2011). There may also be differences in how much the educators allow and encourage children to take part in planning activities and shaping the learning environment. A high degree of physical activity and learning takes place in non- structured environments that are highly variable and often created by the children themselves (Kyhälä, Reunamo & Ruismäki, 2012)

The effect of adults as part of the social environment of day care and as a factor that influences the physical activity of children was also seen in the results of this study. The adults were closer to the children in the age group of 1- 3- year olds than in older age groups, as would be expected because younger children need more looking after. The effect of adults being close on the physical activity of children is not as clear as on older children. 1- 3- year olds have more observations of high physical activity also when the adults are close than older children. The highest amount of high physical activity is when the closest adult is at a distance of 3,1- 5 meters. This has been seen in other stud-

ies also, with children tending to be less active when a larger number of adults are present, or adults are involved in children´s play (Brown et al., 2009, Gubbels et al,. 2011, Soini, 2015). The most observations of high physical activity (42,9%) were made in this study when the closest adult was present and observing the children, but not giving any direct instructions. There was much less high physical activity when the adult was interacting with the children. These results confirm the idea that perhaps adults prefer calm, sedentary activities especially indoors and encourage children to choose them, or possibly even prohibit activities that include high physical activity. Small indoor rooms and the concern for safety are probably one of the reasons for this.

The results stated above, about adults being far from children and not taking part in their activities adding to children´s physical activity should not in my opinion be taken as a call to step back and let children do what they wish, if we want to increase their physical activity, but rather as a call to examine our attitudes and practices in relation to the physically active play of children. In a study by Archer and Siraj (2015) an intervention was made in child care centres with rooms for babies, toddlers and pre-schoolers, where practitioners were given training on movement play and it´s benefits for children in terms of stimulation to the neurological system and learning and development. The results showed that after the intervention there was an increase in the variety of movement- play activities provided, and some children were engaging in more challenging and vigorous play.

In the theory of an ecological view of environment influences on behaviour age is considered a factor that moderates the effect of the physical child- care environment on physical activity. Children aged 1- 3- years spent more time on orientation e.g. wandering around than children in older age groups. They also spent more time with their object of attention being the overall situation and in actions with a low involvement level than older children. When the main action of the child was orientation, the object of attention the overall situation and involvement level low, the physical activity levels were typically low, (3,1% high physical activity recorded in orientation, 16,5% overall situation, 4,7% level 1 involvement) This time spent in orientation and with the child´s attention focused on the overall situation and on low involvement levels can be close to onlooking, a behaviour typical for toddlers, that is described as watching other children play but not entering the play. This is considered an immature form of social participa-

tion and it dramatically increases in children aged 2,5- 3 years and declines during the fourth year. When a child´s behaviour is described as onlooking, it increases the odds of inactivity. Onlooking is sedentary in nature, but it is a primary mechanism for a child´s learning about behavioural expectations, including physical activity. (Bronwyn et al. 2014)

More differences between age groups were found in the child´s main object of attention. Children aged 1- 3- years spent more time with their attention focused on non- social objects such as toys and less time with their attention focused on other children than children in older age groups. There were also more observations of high physical activity when the child´s attention was focused on a non- social object than in older age groups. Children aged 1- 3- years explore their environment through movement and by manipulating objects that interest them. There were the most observations of high physical activity when the child´s attention was focused on one child and for older age groups when the attention was focused on a group of children. As a child grows and develops his focus moves from objects to the social environment. In a study by Gubbels et al. (2011) the activity opportunities of the outdoor environment only had a significant effect on the physical activity of 2- 3- year old children when they were playing together with several peers.

These results show that the ages of 1- 3 years are a unique period in a child´s life and although the physical activity levels and the environmental factors that affect them are somewhat alike in all age groups of under school aged children, there are also special qualities which should be taken into consideration when planning and providing for the activities and learning environment of the youngest children. Because of the many interactions between the physical and social environment and child characteristics, the contextual factors should also be acknowledged when considering the influence of the environment on physical activity.

This data was collected in 2010. Since then the Ministry of Education and Culture has issued new recommendations for physical activity in early childhood, called Finnish recommendations for physical activity in early childhood 2016, Joy, play and doing together. The new recommendations are made to respond to the changes in children's living conditions and are intended for all organisations and individuals involved with un-

der eight- year- olds, for example parents, teachers and healthcare professionals, whereas the old recommendations were made only for early education. The Joy in Motion- national program is expanding among ECEC in Finland to provide information about why and how to increase the physical activity of under school aged children. The new revised Act on Early Childhood Education and Care and the new Core Curriculum for ECEC also give guidelines for physical activity in ECEC. All these together have hopefully had a positive effect on the activity levels of young children and further research is needed to measure these effects.

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APPENDIX

HAVAINNOINTILOMAKE (Liite 2)

Aika (esim. 08.16)

Lapsen numero

A. Lapsen toiminnan yleinen kehys (mitä lapsen pitää/kuuluu tehdä)
1. Suora kasvatustoiminta sisällä (aikuisen suunnittelema toiminta tai toiminta johon aikuinen tuo kasvatuksellisen aineksen: opetus, ohjeistus, ryhmäkokoontuminen, tarinan kertominen esitys jne.)
2. Tuettu leikki sisällä (opettaja ohjaa lasten leikkejä rikastamalla niitä)
3. Vapaa leikki sisällä (lapsi itse päättää mitä, miten tai kenen kanssa leikkii)
4. Toiminta ulkona aikuisen ohjauksessa (leikki, retki, opetus jne.)
5. Vapaa ulkoleikki (usein pihalla, puistossa tms.)
6. Perushoito (pukeminen, riisuminen, WC, hygienia, lepo, valmistautuminen)
7. Ruokailu (aamupala, lounas, ruuan odotus, järjestelyt ennen/jälkeen syömisen).

B. Lapsen oma toiminta (lapsen valinta tai ajautuminen)
1. Orientaatiotoiminta (esim. lapsi kuljeskelee, havainnoi muita muttei osallistu, etsii tai odottaa)
2. Yhdessäolo muiden kanssa (esim. hengailee/kävelee kavereiden kanssa, juttelu kiipeilytelineellä)
3. Leluilla, materiaaleilla, välineillä leikki (esim. hiekalla, keinussa, paperilla)
4. Roolileikki tai mielikuvitusleikki (lelulla tai itsellä on rooli)
5. Kirjan katselu/luku, video, esitys ym.
6. Sääntöleikki (esim. pallopeli, lautapeli, pysyvät säännöt, kilpailu)
7. Tehtävä (esim. työ, paperityö, taidon harjoitus, lorun opettelu)
8. Ei-sallittu toiminta (esim. ohjeiden rikkominen, kiusaaminen, häirintä)
9. Lapsi toimii yleisen toiminnan kehyksen sisällä, mutta ei sovi luokkiin B1-B8 (esim. lapsi syö ruokailussa, pukeutuu pukemisessa)
10. Muu toiminta (ei sovi muihin luokkiin esim. sekavuus, paljon vaihdoksia, ei rakennetta)

C Pääasiallinen huomion kohde
1. Ei-sosiaalinen kohde (esim. lelu, hiekka, auto, palikat, vesi, itse)
2. Aikuinen (esim. seuraa aikuisen kertomusta, keskustelee aikuisen kanssa, tilanteessa voi olla myös ei-sosiaalisia kohteita. Jos tarkkailee myös muita, esim. lapsia, luokitus on C5, kokonaistilanne)
3. Toinen lapsi (mukana voi olla myös leluja ja muita ei-sosiaalisia kohteita)
4. Useita lapsia (2 tai useampia lapsia, mukana voi olla myös. leluja ym.)
5. Kokonaistilanne (tilanteessa niin paljon elementtejä ettei yhtä kohdetta voi nimetä, esim. lapsia, aikuisia, leluja, toimintoja, yleensä muuttuva tilanne)

D Lähin sosiaalinen lapsikontakti (jos on havaittavissa)
Lapsi johon havainnoitava lapsi vahvimmin suuntautuu. Lapsen numerokoodi kirjataan listaan. Jos lähikontaktia on toisesta ryhmästä kirjaa , jos lähikontaktia ei voi nimetä, ruutu jätetään tyhjäksi.
E. Lapsen fyysisen aktiivisuuden taso
1. Matala istuminen, kynän käyttö, syöminen jne.)
2. Kohtuullinen (sisältää kävelyä, koko vartalon liikkeitä)
3. Korkea (sisältää ainakin jonkin verran juoksua, ripeää liikuntaa, fyysistä ponnistelua jne.)
F. Lapsen sitoutuneisuus
1. Yksinkertainen, kaavamainen, toistuva, passiivinen toiminta, ei energiaa, ei älyllistä haastetta
2. Usein keskeytyvä toiminta ja toimintaan kiinnittyminen
3. Enimmäkseen jatkuva toiminta, huomio hajoaa helposti, vähän energiaa
4. Jatkuva toiminta jossa intensiivisiä hetkiä, tarkkaavaisuus ei helposti hajoa
5. Kestävä intensiivinen toiminta, keskittyminen, luovuus, energia ja sitkeys

G Keskimääräinen etäisyys lapsen ja lähimmän aikuisen välillä metreinä

H. Lähimmän aikuisen pääasiallinen toiminta
1. Ei lapsikontaktia, esim. järjestelee asioita, keskustelee toisen aikuisen kanssa
2. Havainnoi lapsia (voi esim järjestellä asioita samaan aikaan)
3. On vuorovaikutuksessa yhden lapsen kanssa.
4. Vuorovaikutus usean lapsen kanssa, lapset ja aikuiset tuottavat vuorovaikutuksen sisällön yhdessä
5. Opettaminen, aikuinen tietää jo mitä pitäisi tehdä, ennalta asetettu tavoite
6. Määrittelemätön tilanne (ei voi erottaa aikuisen pääasiallista toimintaa muuttuvassa tilanteessa)

I. Aikuinen keskittyy lapseen ainakin jonkin aikaa havaintoajasta
1 Kyllä, ainakin muutaman sekunnin keskittyminen lapseen